

## A COMMERCIAL APPLICATION OF VIROFLOW™ TECHNOLOGY

### CASE STUDY: EXCELLENT PLATING WORKS

*“As a result of implementing ViroFlow™ Technology, EPW is now in a position to recycle water with the electroplating process... EPW is now using ViroFlow™ Technology on a permanent basis.”*



*EPW specialise in the plating of parts for the local and United States automotive and telecommunications industries.*

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*EPW are one of the largest electro-coaters in Australia.*

#### PROBLEM

Excellent Plating Works Pty Ltd, (EPW), is a large electroplating company in Moorabbin, Victoria, that specialises in the plating of metal components for the local and United States automotive and telecommunications industries.

EPW approached Virotec after reading about ViroFlow™ Technology's remarkable ability to efficiently remove heavy metals from electroplating industry process water.

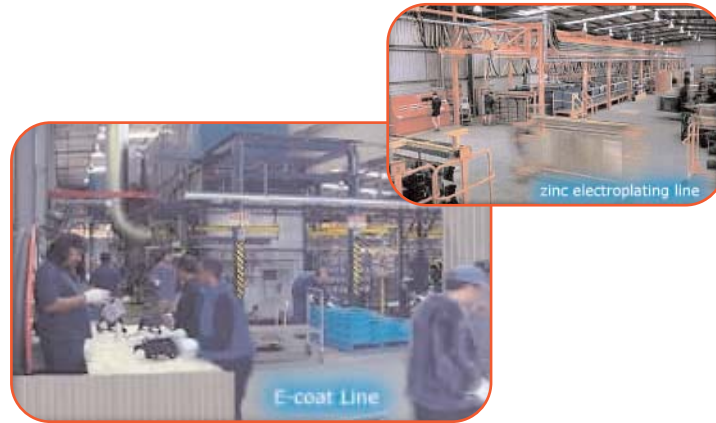
The outcome required by EPW involved a performance optimisation of their existing wastewater treatment process.

#### VIROTEC TOTAL SOLUTION

ViroFlow™ Technology, a total solution service that includes reagents, technical support and liaison with regulatory authorities, was implemented with the following outcomes:

- > Substantial reduction in heavy metal concentrations in water discharged as trade waste. Full compliance with Melbourne Water trade waste discharge limits.
- > The wastewater system was more robust, allowing EPW to discharge resins and other chemicals, without affecting the ability of the treatment system to remove heavy metals.
- > Potential for re-classification of the sludge to "Non-Prescribed" waste, allowing for possible solids re-use or recycling and greatly reducing disposal/management costs.
- > Increased dewatering efficiency resulting in improved water quality and increased plant throughput.
- > A substantial saving in chemical treatment costs by eliminating the use of expensive polymer flocculants.

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**BACKGROUND**

Excellent Plating Works was established in 1969 as a supplier of zinc electroplated parts and has grown into a company with over 70 employees running four state of the art plating lines at a two acre site in Victoria. EPW is one of the largest production electro-coaters in Australia.

EPW provides finishing solutions for companies throughout Australia and serves many industries including automotive, electronics, telecommunications and general fabrication industries in both local and international markets. EPW can handle jobs involving a few hundred to several million parts.

Excellent Plating Works Pty Ltd contacted Virotec Global Solutions wanting to optimise their existing wastewater treatment process, and initial laboratory treatments were performed by Virotec to determine the effectiveness of using the ViroFlow™ Technology ElectroBind™ reagent.

Based on the successful laboratory trials using EPW wastewater, a full-scale trial was commissioned to determine if laboratory results could be successfully scaled up.

Previous work by Virotec had shown that ViroFlow™ Technology has a remarkable ability to remove heavy metals (including copper, zinc, tin, iron, nickel and chromium) from electroplating industry process water.

After highly successful trials, EPW decided to use ViroFlow™ Technology with ElectroBind™ reagent on an ongoing basis.

**TREATMENT METHODS**

The current treatment regime at EPW consists of pH adjustment using hydrochloric acid or sodium hydroxide (pH dependant) and a polymer. ViroFlow™ Technology incorporates the use of ElectroBind™ reagent, a patented environmentally safe reagent. The properties of ElectroBind™ reagent include a high acid neutralising capacity, improved flocculation and fast settling rate

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***Addition of ElectroBind™ reagent to the mixing tank.***

characteristics, reduced sludge volumes, and a high metal binding efficiency.

ElectroBind™ reagent was mixed with the electroplating process wastewater at a predetermined volume-to-mass ratio to ensure optimum contact time and treatment efficiency. This was accomplished by direct addition in a 2,500L mixing tank, shown in the diagram above.

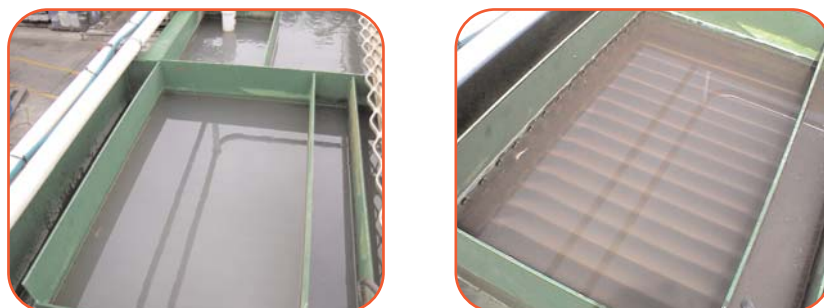
ViroFlow™ Technology replaced the conventional treatment process and produced a dense, stable sediment that was easily recovered and dewatered.

The requirements for adopting ViroFlow™ Technology were compatible with the existing treatment facilities and required no capital works or plant modifications.

The figure below shows treated effluent quality before and after addition of ElectroBind™ reagent. It was noticed that overall water clarity was greatly improved when using ElectroBind™ reagent.

**> Addition of Resins**

Resins are used regularly in the plating lines and EPW have struggled to reduce metal concentrations during times when resins are present in the wastewater. There was a resin surge during the ViroFlow™ Technology trial, which was monitored closely by Virotec and EPW staff, and it was found there was no adverse effect on floc formation, water clarity or heavy metal removal during this surge.



***Top of clarifier showing water quality using existing treatment (left) and ElectroBind™ reagent treatment (right).***

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> **Addition of Sodium Nitrate Solution**

EPW occasionally uses a sodium nitrate solution in the plating lines and this solution dramatically affects the wastewater treatment system because it breaks up the flocs formed using the polymer flocculant.

To test the effect of this solution on treatment using ElectroBind™ reagent, about 6.0 L of concentrated sodium nitrate solution was added to the waste stream by EPW laboratory staff. The sodium nitrate solution had no detrimental effect on floc formation or water clarity when using ElectroBind™ reagent. Furthermore, a sample for laboratory analysis showed that there was no effect on metal binding due to the addition of sodium nitrate.

**RESULTS**

During the application of ViroFlow™ Technology, metal concentrations in the treated water were consistently below the Melbourne Water trade waste discharge limits. The discharge limit for each of the metals shown in Table 1 is 10 mg/L.

*Table 1: Summary of results obtained using ViroFlow™ Technology.*

PARAMETER	RAW EFFLUENT	EXISTING TREATMENT SYSTEM*	ELECTROBIND™ REAGENT	DISCHARGE LIMITS
pH	11.04	7.48	7.69	6.5 – 9.5
TOTAL SUSPENDED SOLIDS (mg/L)	94	69	16	100
CHROMIUM (mg/L)	1.88	1.38	0.47	10
IRON (mg/L)	5.35	4.85	0.70	10
NICKEL (mg/L)	0.016	0.169	0.004	10
ZINC (mg/L)	29.8	17.6	2.31	10

\* Existing treatment sample measured at the same time as raw effluent sample.

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> **Sludge Re-classification**

The solid waste currently produced by EPW is classified as a “prescribed waste” under Victorian State Environmental Law. However, ElectroBind™ has the ability to bind heavy metals very tightly and TCLP analyses prove that only a small fraction of metals bound by ElectroBind™ reagent are leachable.

A sample of solid sludge was retained from the trial in order to conduct TCLP analysis and the results are shown below in Table 2. The results compare very favourably with the Victorian landfill TCLP guidelines. Consequently, it was recommended that EPW make a formal approach to the Victorian EPA to undertake the re-classification exercise to have the residue allocated a non-hazardous classification.

*Table 2: Sludge Analysis*

PARAMETER	ELECTROBIND™ REAGENT TREATED TCLP (MG/L)	VIC EPA GUIDELINE TCLP (MG/L)
NICKEL	<0.005	0.2
CHROMIUM	1.08	-
IRON	0.244	-
ZINC	1.532	50

**CONCLUSION**

The use of ViroFlow™ Technology to treat electroplating effluent is a major advance – proving to be both environmentally sustainable and economically viable.

Treated water quality, after the application of ViroFlow™ Technology, complies with the stringent trade waste limits imposed by Victorian water authorities. All metal concentrations are several times below the discharge standards set by Melbourne Water and represent a substantial improvement compared to the former treatment regime. It was also noted that the visual clarity of the treated effluent was far superior to that achieved with the former system.

ElectroBind™ reagent is non-toxic, non-hazardous and environmentally safe. Furthermore, used ElectroBind™ reagent is not a hazardous or prescribed waste material and the residue may be re-classified as a “non-prescribed” waste.

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## TESTIMONIAL

*“Excellent Plating Works Pty Ltd is a major supplier of zinc electroplating and electrophoretic coatings to the Automotive Manufacturing Industry.*

*Due to increasing water costs, EPW was investigating water reuse options due to the large volumes of water used in the process. It was found that any reuse options were limited due to the moderate zinc levels produced by the existing waste water treatment process. EPW found the compression effect of high levels of surfactant in the waste treatment streams made reduction of zinc to low levels difficult.*

*The company experimented with Virotec's ViroFlow™ Technology to seek predictability in achieving zinc levels at between 1 and 3 mg/L at high flow rates.*

*After one month of extensive trials the targets were achieved with retention rates of 1-1/2 hours at a flow of 40 litres/min. As a result of implementing ViroFlow™ Technology, EPW is now in a position to recycle water with the electroplating process.*

*As an added bonus, the filter cake leachate performance allows cheaper disposal options for the dry discharge.*

*EPW is now using ViroFlow™ Technology on a permanent basis.”*

**PAT AUGHTERSON**  
*Managing Director  
Excellent Plating Works Pty Ltd*