Case Study
2) Twickenham Plating

This company, undertakes reel to reel and barrel plating of connectors for the electrical industry, and is proactively working with Thames Water and the Environment Agency to improve effluent treatment and environmental facilities at their plant in West London. Typically, Cu, Ag, Au, Sn and Ni are used in the plating processes and the site is bordered by the River Brent.

Environmental aims include:

- Compliance with consent conditions
- Reduction of water consumption
- Conservation of resources
- Recovery of materials for re-use
- Ultimately, zero discharge to the sewer

The Metal Finishing Initiative highlighted compliance difficulties which have been resolved. The techniques and equipment installed, to date, have followed the pattern of treatment of waste at source. This philosophy was adopted for the following reasons:

- End of line treatment facilities are, generally, less effective for mixed metal effluents as consent limits are tightened
- A treatment process for a single metal waste enables recycling technology to be employed, which is a requirement of draft IPPC regulations
- A comprehensive end of line plant is impractical for the Twickenham site because of existing drainage routes and a general lack of space
- This is the preferred route for the eventual goal of zero discharge

Good housekeeping has included improved storage of chemicals and bunding of appropriate areas. Additionally, drainage to floor is being reduced.

The introduction of spray rinses has contributed to a reduction in water consumption.

From the outset, the company decided to experiment with a short list the candidates for best available technology (BAT) in treating some of the most common process wastes. They were fortunate to find a company who were willing to produce specialist, pilot scale equipment for ion exchange methodology. Much of the other proprietary equipment was purchased and produced by local contractors to their specifications. Some were made in the company's engineering workshop.

The following techniques were evaluated:

- Enhanced electrowinning
- Selective ion exchange
- Multiple counter-flow cascade drag-out and rinsing systems
- Evaporators
- Neutralisation and filtration

The results of these processes have been successful as described below.

- Electrowinning of drag-outs from silver, acid copper, cyanide copper and tin. A considerable amount of metal is removed from the drag-outs and, hence, concentrations in the rinses which follow are significantly reduced. The silver may be directly reused in plating processes and copper sold for scrap.

- Selective ion exchange has proved to be very efficient. The plants installed were designed to treat the re-circulated final rinse after multiple cascade drag-out rinses. Thus, Cu can be removed from the copper final rinse giving time between regenerations of, typically, one month. In addition, the eluate from the regeneration process, itself, is treated by electrowinning which achieves almost complete recovery of Cu (< 1 mg/l in the trade effluent) and a proportion of the residual acid can be used for the next regeneration. Ni from the final rinse also gives one month between regenerations.

- Evaporators have been used with success and show the greatest potential for recycling of metals back to the plating processes.

- Counter-flow cascade drag-out rinses have proved very efficient in reducing the metal concentration of metals in final rinses.

- The neutralisation plant has proved adequate for rinses from the acid dipping facility and sludge from this process is removed by specialist waste contractor.

Conclusions:

- Compliance with trade effluent standards has been achieved
- Incident avoidance through risk reduction has been achieved
- Water consumption has been reduced
- Materials can be reclaimed and re-used
- Mixed sludge or cake has been eliminated