

7 Practical experiences with reducing industrial use of water and chemicals in the galvanising industry

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Abstract

While ‘Soft’ factors, like employee training, experience and work instructions can significantly reduce the consumption of water and chemicals by galvanising companies, further significant improvements can be achieved by technical measures. This article demonstrates that the reduction of water and chemicals use can yield significant financial benefits to a company, without compromising product quality or productivity.

Based on the results of a benchmarking survey, a systematic optimisation approach was developed to identify all options that help to minimise water consumption and the use of chemicals, and therefore also sludge generation, while at the same time saving the companies money.

Five case studies identified and implemented measures, including changing the rinsing technology in three pickling plants at the wire producer Joh. Pengg GmbH, the use of spent caustic for neutralisation and an electrolysis plant for copper recovery at the printed circuit board manufacturer AT&S, changing the rinsing technology in the production of printing cylinders by Rotoform and a reorganisation of acid management at the Mosdorfer hot-dip zincing plant.

All these measures generally reduced wastewater generation by at least 40 % and the amounts of spent process chemicals that have to be treated by half. All measures paid back according to the financial investment standards used by the companies. The paper also discusses the optimal diffusion of this knowledge.

7.1 Galvanic industries and the environment

Galvanic surface treatment is crucial in modern engineering, producing cheap and durable, long-lasting surfaces. Over 10,000 galvanic companies and 8300 so-called in-house galvanics in Europe employ 440,000 people. This number includes the printed circuit board manufacturing industry.

Galvanic processes do, however, cause environmental problems for the companies using them. Galvanic companies generally consume large amounts of water, and the metal salts, acids and caustics applied in the processes have to be removed from the wastewater by expensive treatments before discharge.

About 1 % of the total hazardous waste in Europe is generated by galvanic companies. In 2002, the amount of sludge from galvanic companies in Germany was estimated to be about 80,000 tons annually. Older estimations indicate more than 250,000 t (1997) of sludge without including anodising and pickling companies. About 3 % of the sludges are used as secondary raw materials; the rest is landfilled. According to the Austrian Environmental Agency, about 10,000 t of hazardous and non-hazardous waste result from the Austrian galvanic industry (Sebesta 2002). The Styrian chamber of commerce reports that about 50,000 t of galvanic and hydroxide sludge is produced in Austria annually.

Analyses of companies with similar products show that their water and chemicals consumption varies greatly (Table 7.1).

An Austrian survey in 2001 arrived at similar results (Fresner 2000). Besides the technology employed, organisational factors like dripping time management, staff training or controlling the consumption of chemicals and water had a significant influence on the generation of waste in surface processing companies.