

MedClean Propre Limpio



No. 3

Pollution prevention case studies

Recycling of cutting-oils in a metal industry company

Company background

LAMINADOS DE ALUMINIO ESPECIALES, S.A. (LAE). (Rubí. Spain) LAE is a company with 100 workers, approximately. Its main activity is the manufacture of evaporators for refrigeration devices from aluminium cylindrical shells 6 millimetres thick. These shells are cut-off and the evaporator design is drop forged. Then, the shells are welded and hot-rolled. In this first hot rolling is where the cutting-oils, the aim of this case study, are used.

Industrial sector

Manufacture of evaporators for refrigeration devices.

Environmental considerations

Metal-industry firms use coolant liquids such as oil-water emulsions (cutting-oils) in some of their more significant operations such as cutting, machine-tooling, rolling and plating, etc.

Direct contact with metal parts and the course of time are some of the causes of its degradation, which can accelerate the wear of machine-tools and prevent their correct operation. The replacement of old emulsions with new formulations generates a waste which must be treated by an authorized waste company.

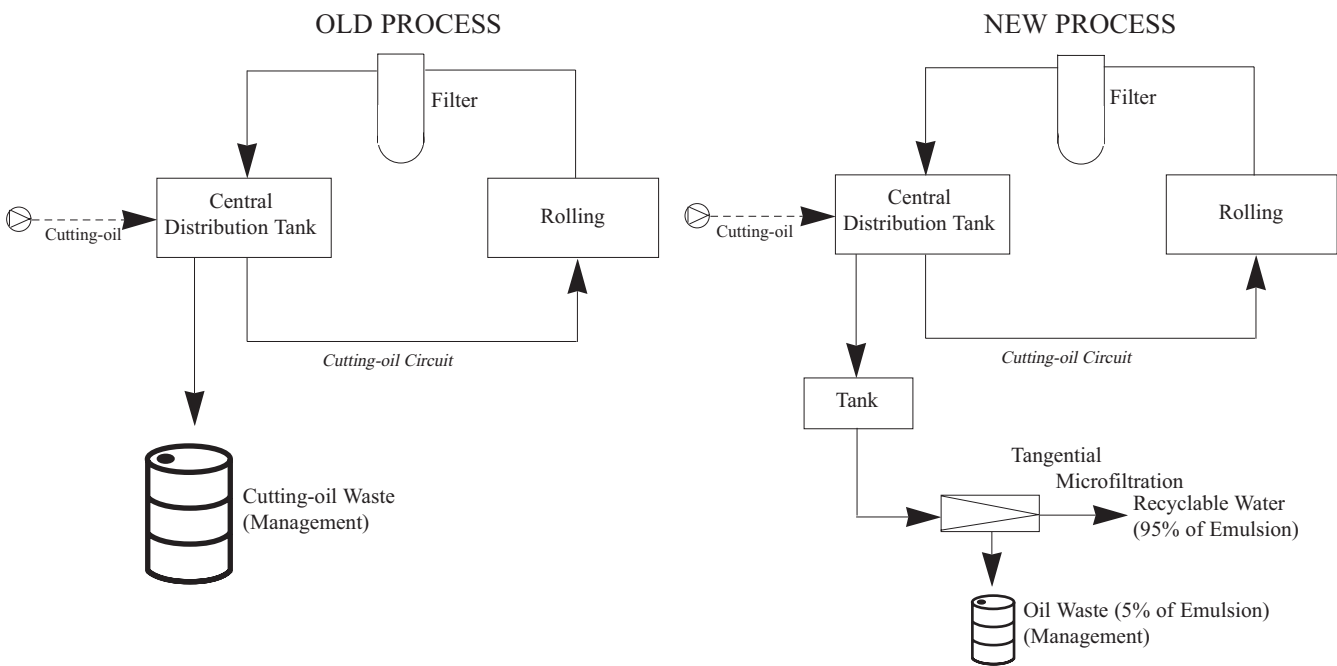
Background

The economic factor played a very important role in LAE's decision to go ahead with the implementation of a closed cutting-oil circuit with the separation of oil and water by means of microfiltration through membranes. This emulsion has a concentration consisting of 5% oils and 95% water. Before minimisation, waste management affected the total emulsion, with the attendant transport and treatment cost. At present, it is only necessary to treat off-site the part corresponding to the emulsified oil when its effective operating capacity is exhausted.

Summary of actions

The modification consisted of the installation of a 3,000-litre underground tank where the recirculated cutting-oil and the spills from manufacturing processes are stored by gravity. After filtering, the cutting-oil is sent to a central distribution tank for reuse. When it is considered to be faulty, the cutting-oil is sent directly from the collection tank to a vertical tank with capacity of 25,000 litres, which feeds an automatic tangential microfiltration unit constituted by 2 filtering modules with ceramic membranes, which have a filtering capacity of 2,900 litres/week. This unit separates the water, which can then be reused thanks to its high quality, from the oils which are no longer reusable and which must be managed as waste.

Diagrams



Balances

	Old process	New process
Waste generation	200,000 l/year	10,000 l/year
Expenses		
Waste treatment	13,333 USD/year	667 USD/year
Waste transport	3,333 USD/year	333 USD/year
Energy	400 USD/year	1,333 USD/year
Personnel	4,000 USD/year	4,000 USD/year
Total cost	21,067 USD/year	6,333 USD/year
Investment		34,067 USD/year
Payback period		2.3 years

Conclusions

Continuous recycling of cutting-oils and the process of concentrating oils by means of microfiltration which LAE has implemented in its Rubí factory, constitutes a good example of conceptually simple action which can be applied to companies that use cutting and machine-tooling fluids in their operations. The semi-permeable membrane technology is sufficiently tested to be successfully used on an industrial scale. One of the advantages which the system presents is its flexibility, since its modular design makes it possible to increase operating capacity with relative ease.

NOTE: This case study seeks only to illustrate a pollution prevention example and should not be taken as a general recommendation.



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