Cut Cost with Vacuum Distillation Systems! Don't Waste Money by Focusing on Investment Cost Only

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Which method is the best for the treatment of industrial waste water occurring in my production? Very often it is easy to answer this question: Vacuum distillation.

Vacuum distillation is established on the market as most feasible and reliable method for the processing of industrial waste water. But which evaporator is the best one for my application? How can I compare the different vacuum distillation systems on the market?

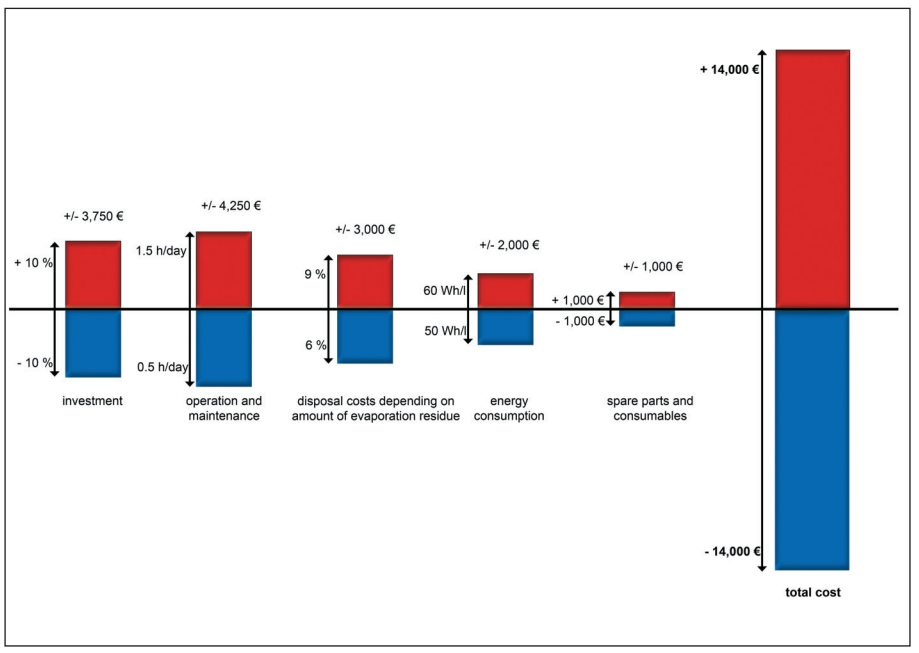
Lifecycle cost analysis (LCC) has proven to be an excellent instrument to prepare investment decisions. To show the procedure the following example has been chosen: A metal processing company has to dispose of 2,500 m³ spent cooling lubricant emulsions per year. Currently they have disposal cost of € 80.00 per m³, amounting to € 200.000,00 per year.

If processed in a vacuum distillation system savings of € 1.2 to 1.3 million can be achieved during the ten year lifecycle of the machine. The company inquired with different suppliers of vacuum distillations systems and found out that comparison of quotations is not easy. Information regarding capacity and electricity consumption are not standardised. In addition this information is insufficient to determine feasibility of a vacuum distillation system.

Other important factors are disposal cost for evaporation residue and required man hours for operation and maintenance.

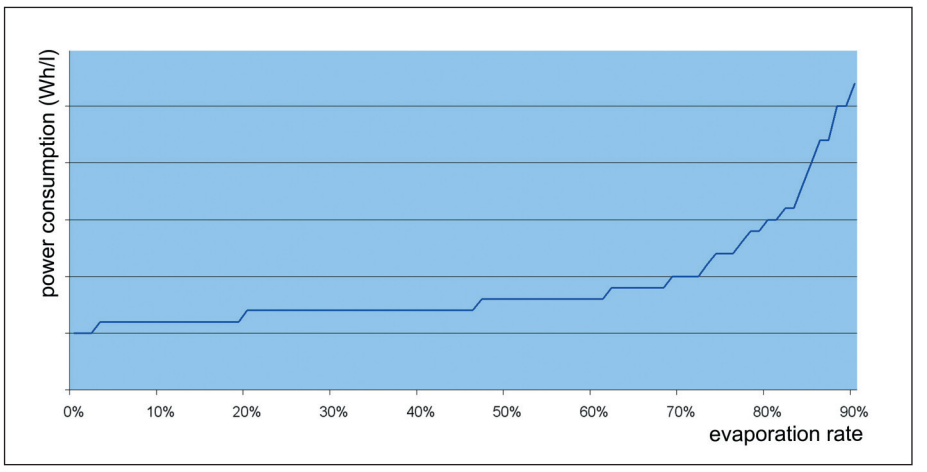
To get a better picture it was decided to prepare a simple LCC including the following costs:

- Depreciation
- Operation and maintenance efforts
- Electricity consumption
- Disposal cost for evaporation residue
- Spare parts, consumables



Depreciation – Investment has Little Influence on Total Operation Cost

Depreciation of the system over the expected 10 years lifecycle amounts to about one third of the operation cost of the vacuum distillation system. On closer inspection one finds out that investment cost reduction of 10% reduces total operation cost only by 3.5%. Other factors have much bigger influence. Price is an important factor, but it should not be the main factor driving the decision in favour of a supplier.



Operation and Maintenance Efforts – Maintenance Friendliness and Quick Service Pays for Itself.

Modern vacuum distillation systems should run fully automatic. A reasonable, self explaining visualisation on the control system makes operation easier. On screen operation and maintenance descriptions support operators in doing their job efficiently. Only half an hour work load increase related to the operation of the vacuum distillation equipment increases total operation cost by more than 5%. This is a bigger impact than a price reduction of 10%.

Quick and reliable service provided by the systems supplier should be possible through remote control. This makes the one or the other on site service unnecessary. In this context maintenance friendliness and reliability should be evaluated. Downtime is expensive. How quickly does the systems supplier react? How far away is the next service base and last but not least how quickly works spare parts supply?

Energy Consumption and Evaporation Residue Disposal – Evaporation Rate and Electricity Consumption Influence Each Other

It is common to state electricity consumption of vacuum distillation systems in Wh/l waste water treated. Certainly power consumption is important; however it is not the only important factor to judge feasibility of the vacuum distillation system. The power consumption of the evaporator at the end of a cycle directly depends on the evaporation rate reached.

Thus evaporation rate and power consumption are interdependent and have to be analysed together. It might make sense to increase power consumption a little bit to increase evaporation rate, thus destruction cost are reduced. Costs for electricity do not fluctuate in the same range as the destruction cost. Reduction of amount of evaporation residue by 10% can reduce total operation cost of the vacuum distillation system by more than 4%. As information of different suppliers regarding evaporation rate vary it makes sense to put focus on this topic.

Finally, in the day to day business the right settings of the vacuum distillation system have to be found to minimize energy and destruction cost. To allow that all relevant data should be logged for respective analysis.

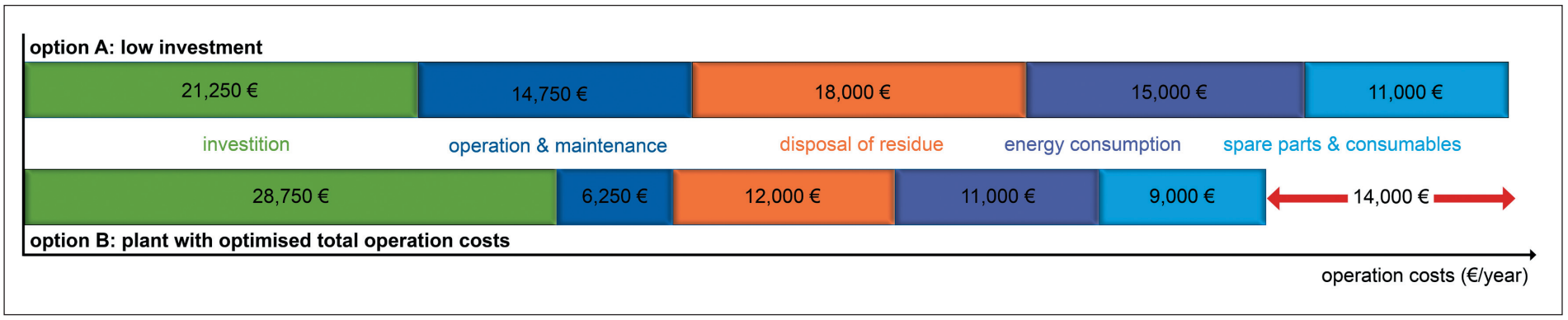
Pre and Post-Treatment – The Total System has to be Looked at

Not only the vacuum distillation system itself is of importance. Peripheral equipment can have big impact on the LCC. Not every process water can be distilled right away. Which pre-treatments are necessary to ensure proper and reliable functioning of the system?

Have floating oils or solids to be removed? Does the process water need neutralisation in continuous feed neutralisation equipment or can this be done space saving without costly equipment inside the vacuum distillation system? What happens to the distillate?

In the ideal case it will be recycled to enable zero liquid discharge. In addition valuable fresh water resources are preserved, and depending on requirements, fresh water treatment cost are saved. Does the distillate quality meet the requirements of the production process or is a post-treatment prior to recycling necessary?

Even if process water quality is similar, distillate qualities of different suppliers of vacuum distillation systems vary. Thus it is useful to include post treatment cost, if any, into the LCC.



Spare Parts and Consumables

This is the smallest cost factor, not having big impact on final decision since variation between different suppliers of vacuum distillation systems are too small.

Analysis – Surprising Results

The result of the LCC surprises. Impact of consumption figures and work load involved in operating the system is three times higher than impact of investment cost. Figure 1 shows different cost factors and their variation depending on suppliers' information.

Figure 3 shows that efforts for operation of the system, evaporation rate and consumption figures have much bigger impact on company earnings of tomorrow, compared to investment cost. In the chosen example the vacuum distillation system can save € 1.2 – 1.3 Mio.

More than 10% of theses savings depend on the right selection of the supplier of the vacuum distillation system. LCC has proven to be a good instrument to prepare investment decision.

Not the best price is the most important cost factor – optimised total operation costs ensure tomorrow's company earnings.

Decision in favour of a specific supplier of vacuum distillation systems is not easy to take. Many different factors are to be considered. Particularly in times of restricted budgets it is shown that investment cost is not the most important topic.

Efforts for operating the vacuum distillation system, evaporation rate and destruction costs have far more impact on the total operation cost of the system, whereas the biggest potential for savings are work load involved, maintenance and repair. Thus it makes sense to carefully analyse work load, reliability, maintenance friendliness and service quality. Finally it is not the lowest price but the lowest operation cost ensuring the tomorrows earnings.

Advantages of Life Circle Cost Analysis for Vacuum Distillation systems:
Earnings of tomorrow are optimised since not only investment is focused on, operation costs are considered as well
No surprises, all cost factors are looked at, project is transparent
Suppliers quotations become compareable, investment decisions are easier